SPECIAL PROCUDURE
(UGIS)

BODY HABITUS

- General physical body appearance
- Classification of the four general shapes of the trunk
- **Mills:** studied the primary classifications of body habitus

STHENIC

- 50%
- **Heart:** moderately transverse
- **Lungs:** moderate length
- **Diaphragm:** moderately high
- **Stomach:** high, upper left
- **Colon:** spread evenly; slight dip in transverse colon
- **Gallbladder:** centered on right side upper abdomen

CHARACTERISTICS OF STHENIC

- **Build:** Moderately heavy
- **Abdomen:** moderately long
- **Thorax:** moderately short, broad and deep
- **Pelvis:** relatively small

ASTHENIC

- 10%
- **Heart:** nearly vertical and at midline
- **Lungs:** long; apices above clavicles; may be broader above base
- **Diaphragm:** low
- **Stomach:** low and medial in the pelvis when standing
- **Colon:** low; folds on itself
- **Gallbladder:** low and nearer the midline

CHARACTERISTICS OF ASTHENIC

- **Build:** frail
- **Abdomen:** short
- **Thorax:** shallow
- **Pelvis:** wide

HYPOSTHENIC

- 35%
- Lies between sthenic and asthenic

HYPERSTHENIC

- 5%
- **Heart:** axis nearly transverse
- **Lungs:** short; apices at or near clavicles
- **Diaphragm:** high
- **Stomach:** high, transverse and in the middle
- **Colon:** around periphery of abdomen
- **Gallbladder:** high; outside; lies more parallel

CHARACTERISTICS OF HYPERSTHENIC

- **Build:** massive
- **Abdomen:** long
- **Thorax:** short, broad and deep
- **Pelvis:** narrow

PATHOLOGY

ACHALASIA

- Failure of the smooth muscle of the alimentary canal to relax

APPENDICITIS

- Inflammation of the appendix

BARRETT'S ESOPHAGUS

- Peptic ulcer of the lower esophagus

BEZOAR

- Mass of undigested material that becomes trapped into the stomach

SPECIAL PROCUDURE
(UGIS)

- **Phytobezoar:** ingested vegetable, fiber or seeds
- **Trichobezoar:** ingested hair

CARCINOMA
- Malignant new growth composed of epithelial cells

CECAL VOLVULUS
- Ascending colon and cecum having a long mesentery
- More susceptible to volvulus

COLITIS
- Inflammation of the colon

DIVERTICULITIS
- Inflammation of diverticula in the alimentary canal

DIVERTICULOSIS
- Diverticula in the colon without inflammation or symptoms

DIVERTICULUM
- Pouchlike herniatons of a portion of the mucosal wall

DYSPHAGIA
- Difficulty of swallowing

EMESIS
- Act of vomiting
- **Hematemesis:** vomiting of blood

ESOPHAGEAL VARICES
- Enlarged tortuous veins of the lower esophagus resulting from portal hypertension

GASTRITIS
- Inflammation of the lining of the stomach

GASTROESOPHAGEAL REFLUX DISEASE (GERD)
- Backward flow of the stomach contents into the esophagus

GIARDIASIS
- Common infection of the lumen of small intestine
- Caused by flagellated protozoa *"Giardia lamblia"*

HIATAL HERNIA
- Protrusion of the stomach through the esophageal hiatus if the diaphragm

HIRSCHSPRUNG'S/CONGENITAL AGANGLIONIC MEGACOLON
- Absence of parasympathetic ganglia usually in the distal colon resulting in the absence of peristalsis

HYPERTROPHIC PYLORIC STENOSIS (HPS)
- Most common gastric obstruction in infants
- Caused by hypertrophy of the antral muscle at the orifice of the pylorus

ILEUS
- Failure of bowel peristalsis
- **Adynamic/paralytic ileus:** due to cessation of peristalsis
- **Mechanical ileus:** blockage caused by tumors, adhesions or hernias

INGUINAL HERNIA
- Protrusion of the bowel into the groin

SPECIAL PROCUDURE
(UGIS)

INTUSSUSCEPTION

- Prolapse of a portion of the bowel into the lumen of an adjacent part

MALABSORPTION SYNDROME

- Disorder in which subabnormal absorption of dietary constituents occurs

CELIAC DISEASE/SPRUE

- Malabsorption disease caused by a mucosal defect in the jejunum

MECKEL'S DIVERTICULUM

- Diverticulum of the distal ileum, similar to the appendix

POLYPS

- Growth or mass protruding from a mucous membrane

PYLORIC STENOSIS

- Narrowing of the pyloric canal causing obstruction

REGIONAL ENTERITIS/CROHN'S DISEASE

- Inflammatory bowel disease, most commonly involving distal ileum

SITUS INVERSUS

- Abdominal and thoracic organs are reversed from their normal orientation in the body

SLIDING HIATAL HERNIA

- Caused by weakening of a esophageal sphincter

ULCER

- Depressed lesion on the surface of the alimentary canal
- **Gastric ulcer:** ulcer of the gastric mucosa
- **Peptic ulcer:** ulceration of the mucous membrane of the esophagus
- **Duodenal ulcer:** peptic ulcer in the duodenum
- **Perforating ulcer:** ulcer involving the entire thickness of the wall of stomach and intestine, creating an opening

ULCERATIVE COLITIS

- Recurrent disorder causing inflammatory ulceration in the colon

VOLVULUS

- Twisting of a bowel loop on itself

ZENKER'S DIVERTICULUM

- Diverticulum located just above the cardiac portion of the stomach

GASTROINTESTINAL TRANSIT

PERISTALSIS

- Contraction waves by which the digestive tube propels its contents toward the anus
- **Stomach:** 3-4 waves/minute
- **Stomach emptying time:** 2-3 hours
- **Intestine:**
  - Upper part – greatest peristaltic action
  - Lower part – decreased peristaltic action
  - Duodenum & jejunum – localized contraction
    - 3-4 seconds interval
- **Barium reaches:**
  - Ileocecal valve – 2-3 hours
  - Sigmoid colon – 4-5 hours
  - Rectum – 24 hours

SPECIAL PROCUDURE
(UGIS)

CONTRAST MEDIA

BARIUM SULFATE

- A water insoluble salt of the metallic element barium
- Universally used
- **Forms:**
    - Dry powder – mixed with plain water
    - Liquid

- **Barium transit depends on:**
    - Suspending medium
    - Temperature of the medium
    - Consistency of the preparation
    - Motile function of the alimentary canal
- **Water-insoluble, iodinated contrast media:**
    - Modifications of basic intravenous urographic media
        - Diatrizoate sodium
        - Diatrizoate meglumine

IODINATED CONTRAST MEDIA

- Move quicker than barium
- **Clears stomach:** 1-2 hours
- **Reaches colon:** 4 hours
- **Advantage:**
    - It outlines the esophagus
    - It permits rapid survey of entire small intestine
    - Rapid investigation of large intestine can be performed (oral route)
        - For uncooperative patient during BE
    - Easily removed by aspiration
    - No ill effects when escape in the peritoneum
        - **Rationale:** readily absorbed in from peritoneal cavity & excreted by the kidneys
- **Disadvantage:**
    - Does not adhere to the mucosa
    - Fails to provide clear anatomic detail of small intestine
        - **Rationale:** dilution of CM & decrease in opacification
    - Strongly bitter taste
    - Hyperosmolar

SUSPENDED/FLOCCULATION-RESISTANT PREPARATIONS

- Barium preparations that contain gums or other suspending agents

ESOPHAGUS CONTRAST STUDIES

- Full-column single contrast study
    - Barium or water soluble
    - 30%-50% weight/volume suspension
- Double contrast
    - High density barium and carbon dioxide crystals
    - Low-viscosity, high density barium
- No preliminary preparation

OPAQUE FOREIGN BODIES

- No contrast media used
- **Demonstration:**
    - Soft tissue lateral projection of the neck
        - Delineates FB in the upper end of intrathoracic esophagus
    - Tufts/pledges of cotton saturated with a thin barium suspension
        - To demonstrate obstruction
        - To detect nonopaque FB in pharynx and upper esophagus

SPECIAL PROCUDURE
(UGIS)

ESOPHAGRAM/BARIUM SWALLOW/BARIUM MEAL

ESOPHAGRAM

- Performed to evaluate pharynx and esophagus

PATHOLOGIC INDICATIONS

- Achalasia
- Barret's esophagus
- Dysphagia
- Adenocarcinoma
    - Most common malignancy
- Esophageal varices
- Foreign bodies
- Gastroesophageal Reflux Disease/Esophageal Reflux
    - Confirmed during endoscopy

CONTRAINDICATION

- No major contraindication
- Sensitivity to CM

DEMONSTRATION OF ESOPHAGEAL REFLUX

- Breathing exercises
- Water test
- Compression paddle technique
- Toe-touch maneuver

BREATHING EXERCISES

- To increase both intrathoracic and intraabdominal pressures

1.) Valsalva Maneuver

- Patient is asked to take a deep breath
- While holding the breath in, to bear down as though trying to move the bowels
- It forces air against the closed glottis

2.) Modified Valsalva Maneuver

- Patient pinches of the nose
- Closes the mouth
- Tries to blow the nose
- Cheeks should expand outward

3.) Mueller Manuever

- Patient exhales
- Tries to inhale against closed glottis

WATER TEST

- Supine
- LPO – fills fundus with barium
- Patient is asked to swallow a mouthful of water through straw
- **Positive Water Test:** occurs when significant amount of barium regurgitate into esophagus from the stomach

COMPRESSION TECHNIQUE

- Prone
- Compression paddle placed under the patient and inflated
    - To provide pressure to the stomach region

TOE-TOUCH MANEUVER

- Under fluoroscopy, cardiac orifice is observed
- Patient bends over and touches the toes
- Demonstrates hiatal hernias and esophageal reflux

SPECIAL PROCUDURE
(UGIS)

POSITIONING ROUTINES

PP: Patient/Part Position
RP: Reference Point
CR: Central Ray
SS: Structure Shown
ER: Exam Rationale

AP/PA PROJECTION

PP: Supine/prone;

- **Recumbent position:**
    - Used to obtain more complete contrast filling
    - Filling of proximal part of esophagus
    - Used for demonstration of variceal distentions of the esophageal veins
        - **Rationale:** varices are best filled by having the blood flow against gravity
    - **Variceal filling (more complete):**
        - Full expiration
        - Valsalva maneuver

RP: Level of T5-T6
CR: Perpendicular
SS: Esophagus superimposing thoracic vertebrae

OBLIQUE PROJECTION

RAO Position

PP: RAO 35-40^{o}
RP: Level of T5-T6
CR: Perpendicular
SS:

- Best demonstrate the esophagus
- Esophagus between the vertebral column and heart

LAO Position

PP: LAO 35-40^{o};
RP: Level of T5-T6
CR: Perpendicular
SS: Esophagus between the hilar region of lungs and thoracic spine

LATERAL PROJECTION

PP: Patient's arm forward; pillow near head
RP: Level of T5-T6
CR: Perpendicular
SS: Esophagus between thoracic spine and heart

- **Swimmer's Lateral Position:**
- For better visualization of the upper esophagus
- Prevent superimposition of upper esophagus to arms and shoulder

VALSALVA MANUEVER

- For demonstration of esophageal varices

SPECIAL PROCUDURE
(UGIS)

UPPER GASTROINTESTINAL SERIES

UPPER GI SERIES (UGIS)

- Performed to evaluate the distal esophagus, stomach and small intestine

PATHOLOGIC INDICATIONS

- Bezoar
- Diverticula
- Emesis
    - Hematemesis
- Gastric carcinoma
- Gastritis
- Hiatal hernia
- Sliding hiatal hernia
- Hypertonic pyloric stenosis
- Ulcer
    - Duodenal
    - Peptic
    - Gastric
    - Perforating

PURPOSE OF PRELIMINARY RADIOGRAPH

- To delineate liver, spleen, kidneys, psoas muscles and bony structure
- To detect any abdominal or pelvic calcifications
- To detect tumor masses

PRELIMINARY PRERPARATION

- Told the patient the approximate time required for the procedure
- Explain the procedure
- NPO 8-9 hours before examination
    - **Rationale:**
        - To empty the stomach & small intestine
        - To have colon free of gas and fecal material
- NPO after evening meal
    - For small intestine study
- No smoking or chewing a gum
    - **Rationale:**
        - Stimulate gastric secretion and salivation
        - Prevent excessive fluid from accumulating the stomach
        - Prevent diluting the barium suspension

CONTRAST STUDIES

- Single contrast
- Double contrast
    - **Advantages over single contrast:**
        - Small lesions are less easily obscured
        - Mucosal lining of the stomach can be more clearly visualize
    - **Instructing the patient to roll side to side:**
        - **Rationale:** to coat the mucosal lining of the stomach
    - **Giving glucagon/anticholinergic medications before exam**
        - **Rationale:**
            - To relax the GI tract
            - To improve visualization by inducing distention of stomach and intestine
- **Biphasic examination**
    - Combination of single and double contrast
    - Advantage over single & double contrast:

        - Increase accuracy of diagnosis without increasing the cost of the examination
- **Hypotonic duodenography**
    - Used for evaluation of postbulbar duodenal lesions
    - For detection of pancreatic disease
    - Less frequently performed
        - **Rationale:**
            - Double GI exam
            - CT scan
            - Needle biopsy
    - First described by Liotta
    - Requires intubation

PATIENT POSITION

- Trendelenburg 25-30^{o}
    - Used to demonstrate hiatal hernia
- Trendelenburg 10-15^{o} and slightly toward the right side (slightly RPO)
    - Used to demonstrate esophageal regurgitation and hiatal hernia
    - **Rationale of RPO:** to place the esophagastric junction in profile to the right of the spine

POSITIONING ROUTINES

PA PROJECTION

PP: Prone/upright

- **Upright:** used to demonstrate the relative position of the stomach

RP:

- **Sthenic:**
    - L1-L2 (1-2 in above lower rib margin; prone) – **Ballinger**
        - 3-6 in. lower (upright)
    - L1 & 1 in. left of the vertebral column (prone) – **Bontrager**
- **Asthenic:** 2 in. inferior to L1 (prone) – **Bontrager**
- **Hypersthenic:** 2 in. superior to L1 (prone) – **Bontrager**

CR: Perpendicular

SS:

- **Prone:** barium-filled stomach and duodenal bulb
- **Upright:** shows relative size, shape and position of the filled stomach
    - Fundus not adequately demonstrated
- **Asthenic/Hyposthenic:** pyloric canal and duodenal bulb (well demonstrated)
- **Sthenic:** pyloric canal and duodenal bulb (partially obscured)
    - **Compensation:** PA Axial Projection
- **Hypersthenic:** pyloric canal and duodenal bulb (completely obscured)
    - **Compensation:** PA Axial Projection

TAKENOTE: Prone Position

- Stomach moves superiorly 1.5-4 in.
- Stomach spreads horizontally and decrease in length
- Fundus fills in asthenic patient

PA OBLIQUE PROJECTION
RAO Position

PP: Prone

- **RAO 40-70^{o}:** gives the best image of pyloric canal and duodenum
- **Hypersthenic (70^{o}):** required greater degree of rotation
- **Sthenic (45-55^{o})/Asthenic (40^{o}):** required less degree of rotation
- **RAO Position:**
    - Used for serial studies of pyloric canal and duodenal bulb
    - **Rationale:** gastric peristalsis is more active

SPECIAL PROCUDURE
(UGIS)

RP:

- **Sthenic:**
  - L1-L2 – **Ballinger**
  - L1, midway b/n spine and upside lateral border of abdomen – **Bontrager**
- **Asthenic:** 2 in. inferior to L1– **Bontrager**
- **Hypersthenic:** 2 in. superior to L1 – **Bontrager**

CR: Perpendicular

SS: Stomach and entire duodenal loop

- **Sthenic:** Best image of pyloric canal and duodenal bulb

ER:

- For serial and mucosal studies of stomach and duodenum
  - Pneumatic paddle is used
    - Positioned under pyloric sphincter & duodenal bulb
  - To demonstrate compression and noncompression study of the pyloric end (stomach) and duodenal bulb at different stages of filling and emptying
  - To demonstrate compression study of the mucosa of a localized area of the GI tract

AP OBLIQUE PROJECTION
LPO Position

PP: Supine

- **Sthenic:** LPO 45^{o}
- **Hypersthenic:** LPO 60^{o}
- **Asthenic:** LPO 30^{o}

RP:

- **Sthenic:**
  - L1 (midway b/n xiphoid and lower rib margin) – **Ballinger & Bontrager**
- **Asthenic:** 2 in. inferior to L1– **Bontrager**
- **Hypersthenic:** 2 in. superior to L1 – **Bontrager**

CR: Perpendicular

SS: Fundic portion of the stomach (barium-filled)

- Pyloric canal and duodenal bulb are not demonstrated
  - **Rationale:**
    - Not filled with barium
    - Effect of gravity
    - They are in opposite direction
- **Double contrast:** pyloric canal and duodenal bulb are demonstrated (air-filled)

LATERAL PROJECTION

PP: Recumbent/upright

- **Upright left lateral position:**
  - Left retrogastric space
- **Recumbent right-lateral position:**
  - Right retrogastric space
  - Duodenal loop
  - Duodenojejunal junction
- **Retrogastic space:** space behind the stomach

RP:

- **Sthenic:**
  - L1-L2 (recumbent); L3 (upright) – **Ballinger**
  - L1 & 1-1.5 in. anterior to MCP – **Bontrager**
- **Asthenic:** 2 in. inferior to L1– **Bontrager**
- **Hypersthenic:** 2 in. superior to L1 – **Bontrager**

CR: Perpendicular

SS:

- Anterior and posterior aspect of the stomach
- Pyloric canal and duodenal bulb
- **Right lateral projection:** best demonstrate pyloric canal and duodenal bulb (C-loop) in **HYPERSTHENIC PATIENT**

SPECIAL PROCUDURE
(UGIS)

AP PROJECTION

PP: Supine

- **Full trendelenburg:** diaphragmatic herniations
- **Partial trendelenburg:** for fundus filling (asthenic patient)

RP:

- **Sthenic:**
  - L1-L2 – **Ballinger**
  - L1 & midway b/n midline & left lateral margin – **Bontrager**
- **Asthenic:** 2 in. inferior to L1– **Bontrager**
- **Hypersthenic:** 2 in. superior to L1 – **Bontrager**

CR: Perpendicular

SS:

- Best demonstrate retrogastric portion of the duodenum and jejunum
- Barium-filled fundic portion
- Double contrast delineation of the body, pyloric portion & duodenum
- **In diaphragm:** demonstrate organ/s involved in gross hernia protrusion

TAKENOTE: Supine Position

- Stomach moves superiorly and to the left
- **Sthenic:** intestinal loops move superiorly & pyloric end is elevated
  - **Effects:**
    - Barium-filled cardiac and fundic portion
    - Air-filled pyloric portion
      - **Rationale:** gastric bubbles displaced into it
  - Allows double contrast examination of posterior wall lesions
- **Asthenic:** intestinal loops do not move superiorly
  - **Effects:** fundic portion is not filled
    - **Compensation:**
      - LPO position
      - Partial trendelenburg position

MODIFICATIONS/METHODS IN UGIS

GORDON'S MODIFICATION
PA AXIAL PROJECTION

PP: Prone

RP:

- **Sthenic:** L2
- **Asthenic:** 1-2 in. inferior to L2
- **Hypersthenic:** 1-2 in. superior to L2

CR: 35-45^{o} cephalad

SS:

- Greater and lesser curvature
- Antral portion of the stomach
- Pyloric canal and duodenal bulb

ER: To open up the high, horizontal stomach of **HYPERSTHENIC PATIENT**

GUGLIANTINI'S MODIFICATION
PA AXIAL PROJECTION

PP: Prone

RP:

- **Sthenic:** L2
- **Asthenic:** 1-2 in. inferior to L2
- **Hypersthenic:** 1-2 in. superior to L2

CR: 20-25^{o} cephalad

SS:

- Greater and lesser curvature
- Antral portion of the stomach
- Pyloric canal and duodenal bulb

ER: For demonstration of stomach in **INFANTS**

SPECIAL PROCUDURE
(UGIS)

HAMPTON'S MODIFICATION

PP: Supine; body 45^{o} towards the side of interest
CR: Perpendicular
SS: Best modification to demonstrate a leaf like pattern of the pylorus and the valve

POPPEL'S METHOD

SS: Retrogastric space
ER:

- Used to demonstrate right angle view of the stomach
- For evaluation of pancreatic pathology
    - Pancreatic mass
    - Pancreatic cancer
    - Pancreatitis

WOLF METHOD

- A modification of Trendelenburg
- **Requires:** semicylindric radiolucent compression device
- **Compression device:**
    - Provides Trendelenburg angulation
    - Increases intraabdominal pressure
    - Permit adequate contrast filling
    - Permit maximum distention of the entire esophagus
    - stated by **WOLF** & **GUGLIELMO**
    - **Advantages:**
        - Does not require table angulation
        - Patient can hold barium container and ingest with comparative ease

WOLF METHOD
PA OBLIQUE PROJECTION
RAO Position

PP: Prone; RAO 40-45^{o}

- **Assume modified knee-chest position:** during placement of compression device
- **Compression device placement:**
    - Horizontally under the abdomen
    - Below costal margin
- **Barium ingestion:** rapid, continuous swallow
- **Make exposure during 3rd & 4th swallow:**
    - **Rationale:** to allow for complete filling of the esophagus

RP: T6-T7
CR: Perpendicular

- **TAKENOTE:** the position results in a **10-20^{o} caudad CR angulation**

SS: Relationship of stomach to the diaphragm

- Useful in diagnosing hiatal hernia

ER:

- For the purpose of applying greater intraabdominal pressure
- For demonstration of small, sliding gastroesophageal herniation through the esophageal hiatus

-THE END-

"There are no secrets to success. It is the result of preparation, hard work learning from failure"
05/24/14